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10/633,014	08/01/2003	Yushi Kaneda	NP-0079	4735

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EXAMINER	
VAN ROY, TOD THOMAS	

ART UNIT	PAPER NUMBER
2828	

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/633,014	Applicant(s) KANEDA ET AL.
	Examiner Tod T. Van Roy	Art Unit 2828

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☒ Claim(s) 20,22 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 08/01/2003 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 08/01/2003.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: pg.6 speaks of element #66 not found in fig.4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Fig.8b #100. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing

date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

Pg.2 line 14 should read, "is oscillated".

Appropriate correction is required.

Claim Objections

Claim 20 is objected to because of the following informalities: Line 8 is missing a word and should read "resonant cavity". Appropriate correction is required.

Double Patenting

Claim 22 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 3. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

It is believed that this claim should be dependent on claim 20 as opposed to claim 1. The examiner also notes that if this is the case the terms "narrowband fiber grating" and "broadband grating" lack antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-7, and 9-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shevy et al. (USPGPUB 2004/0057471) in view of Yao (US 6480637).

With respect to claim 1, Shevy teaches a polarization-dependent resonant cavity (fig.1 #100, noting PM fiber segments) including a fiber chain having a gain medium (fig.1 #150) between narrowband (fig.1 121, see fig.5 #512) and broadband fiber gratings (fig.1 #111, see fig.5 #521), a pump source that couples energy into the fiber

chain to pump the gain medium (fig.1 #101). Shevy does not teach a modulator for q-switching the laser. Yao teaches a modulator that applies stress to a fiber inducing birefringence (col.2 lines 55-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization-dependent laser cavity of Shevy with the modulator of Yao in order to properly control the polarization of the light propagating in the fiber (Yao, col.1 lines 6-8) and inherently alter the Q of the cavity due to induced polarization based reflection losses allowing for the storage and release of energy in the gain medium.

While not relied upon in this rejection, Imai et al. ("A wavelength Tunable Q-Switching EDF Laser with Fiber Bragg Grating Mirrors", Jpn. J. Appl. Phys., Vol. 35 (1996), pgs. 1275-1277, note col.2-3 lines 30-3) further speaks of the inherent altering of the cavity Q upon addition of stress to the fiber.

With respect to claim 2, Shevy and Yao teach the laser outlined in the rejection to claim 1 and further teach a portion of the fiber chain to comprise a polarization-dependent fiber (Shevy, fig.1 #110).

With respect to claim 3, Shevy and Yao teach the laser outlined in the rejection to claim 1 and further teach the narrowband fiber grating to be formed in a polarization maintaining (PM) fiber (Shevy, fig.1 #121,120) creating a pair of reflection bands that correspond to different polarization modes (Shevy, [0036] lines 1-5), and the broadband grating having a reflection band that is aligned to one of the narrowband grating's reflection bands (Shevy, [0036] lines 5-10).

With respect to claim 4, Shevy and Yao teach the laser outlined in the rejection to claim 1 and further teach the modulator to comprise a piezoelectric transducer (PZT) (Yao, col.2 lines 6-11).

With respect to claim 5, Shevy and Yao teach the laser outlined in the rejection to claim 1 and further teach the PZT to be driven at less than 50V (Yao, col.3 lines 53-67).

With respect to claim 6, Shevy and Yao teach the laser outlined in the rejection to claim 1 and further teach the retardance of the birefringence to be variable from 0 to 2pi (Yao, col.2 lines 62-65, it is a matter of design choice as to which value is suitable for the intended purpose and is further described by MPEP 2144.07).

With respect to claim 7, Shevy and Yao teach the laser outlined in the rejection to claim 1 and further teach the gain medium to be formed in an oxide-based multi-component glass fiber (Shevy, [0030] lines 17-20) and the gratings to be located in separate fibers fused at either end of the multi-component fiber ([0030] lines 24-30) but do not teach the gratings to be formed in passive silica fiber. Silica fibers are very well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to locate the gratings in passive silica fibers, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

With respect to claims 9-11, Shevy and Yao teach the laser outlined in the rejection to claim 1 but do not teach the full-width half-maximum of the laser pulse to be less than 100 ns, the repetition rate of the laser pulse to be at least 1kHz, or the peak

power to be at least 1W. The operational characteristics of the laser are a matter of design choice and intended usage, thus it would have been obvious to one of ordinary skill in the art at the time of the invention to operate the laser device of Shevy and Yao at suitable levels to fit a desired application.

With respect to claim 12, Shevy teaches a polarization-dependent resonant cavity (fig.1 #100, noting PM fiber segments) including a gain fiber (fig.1 #150), a narrowband grating formed in a PM fiber spliced to one end of the gain fiber (fig.1 121, see fig.5 #512, col.4 lines 24-30), said narrowband grating in said PM fiber having two reflection bands that correspond to different polarization modes ([0036] lines 1-5), and a broadband grating formed in a fiber spliced to the other end of the gain fiber (fig.1 #111, see fig.5 #521, col.4 lines 24-30), said broadband grating having a reflection band that is aligned to one of the narrowband grating's reflection bands ([0036] lines 5-10), a pump source that couples energy into the resonant cavity to pump the gain fiber (fig.1 #101). Shevy does not teach a modulator for q-switching the laser. Yao teaches a modulator that applies stress to a fiber inducing birefringence (col.2 lines 55-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization-dependent laser cavity of Shevy with the modulator of Yao in order to properly control the polarization of the light propagating in the fiber (Yao, col.1 lines 6-8) and inherently alter the Q of the cavity due to induced polarization based reflection losses allowing for the storage and release of energy in the gain medium.

While not relied upon in this rejection, Imai et al. ("A wavelength Tunable Q-Switching EDF Laser with Fiber Bragg Grating Mirrors", Jpn. J. Appl. Phys., Vol. 35

(1996), pgs. 1275-1277, note col.2-3 lines 30-3) further speaks of the inherent altering of the cavity Q upon addition of stress to the fiber.

With respect to claim 13, Shevy and Yao teach the laser outlined in the rejection to claim 12 and further teach the modulator to comprise a piezoelectric transducer (PZT) (Yao, col.2 lines 6-11).

With respect to claim 14, Shevy and Yao teach the laser outlined in the rejection to claim 12 and further teach the retardance of the birefringence to be variable from 0 to 2pi (Yao, col.2 lines 62-65, it is a matter of design choice as to which value is suitable for the intended purpose and is further described by MPEP 2144.07).

With respect to claim 15, Shevy and Yao teach the laser outlined in the rejection to claim 12 and further teach the gain fiber to be formed of an oxide-based multi-component glass (Shevy, [0030] lines 17-20) and the gratings to be located in separate fibers fused at either end of the multi-component fiber ([0030] lines 24-30) but do not teach the gratings to be formed in passive silica fiber. Silica fibers are very well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to locate the gratings in passive silica fibers, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

With respect to claim 16, Shevy teaches a polarization-dependent resonant cavity (fig.1 #100, noting PM fiber segments) including a gain fiber (fig.1 #150) formed of an oxide-based multi-component glass ([0030] lines 17-20), a narrowband grating

(fig.1 121, see fig.5 #512, col.4 lines 24-30) in a passive silica PM fiber (see rejection to claim 7 above), said narrowband grating in said PM fiber having two reflection bands that correspond to different polarization modes ([0036] lines 1-5), and a broadband grating (fig.1 #111, see fig.5 #521, col.4 lines 24-30) formed in a passive silica fiber (see rejection to claim 7 above), said broadband grating having a reflection band that is aligned to one of the narrowband gratings reflection bands ([0036] lines 5-10), and a pump source that couples energy into the resonant cavity to pump the gain fiber (fig.1 #101). Shevy does not teach a piezoelectric transducer for q-switching the laser. Yao teaches a PZT (col.2 lines 6-11) that applies stress to a fiber inducing birefringence (col.2 lines 55-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization-dependent laser cavity of Shevy with the modulator of Yao in order to properly control the polarization of the light propagating in the fiber (Yao, col.1 lines 6-8) and inherently alter the Q of the cavity due to induced polarization based reflection losses allowing for the storage and release of energy in the gain medium.

While not relied upon in this rejection, Imai et al. ("A wavelength Tunable Q-Switching EDF Laser with Fiber Bragg Grating Mirrors", Jpn. J. Appl. Phys., Vol. 35 (1996), pgs. 1275-1277, note col.2-3 lines 30-3) further speaks of the inherent altering of the cavity Q upon addition of stress to the fiber.

With respect to claims 17-19, Shevy and Yao teach the laser outlined in the rejection to claim 16 but do not teach the full-width half-maximum of the laser pulse to be less than 100 ns, the repetition rate of the laser pulse to be at least 1kHz, or the

peak power to be at least 1W. The operational characteristics of the laser are a matter of design choice and intended usage, thus it would have been obvious to one of ordinary skill in the art at the time of the invention to operate the laser device of Shevy and Yao at suitable levels to fit a desired application.

With respect to claim 20, Shevy teaches a resonant cavity (fig.1 #100) including a narrowband reflector (fig.1 #121, see fig.5 #512) having a polarization-dependent reflection band centered at a laser wavelength ([0036] lines 1-5), a gain medium (fig.1 #150) and a broadband reflector (fig.1 #111, see fig.5 #521) having a reflection band that overlaps the polarization-dependent reflection band ([0036] lines 5-10) so that the cavity has a high Q-factor at the laser wavelength and polarization, a pump source that couples energy into the resonant cavity to pump the gain medium (fig.1 #101). Shevy does not teach a modulator for q-switching the laser. Yao teaches a modulator that applies stress to a fiber affecting the polarization of light (col.2 lines 55-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization-dependent laser cavity of Shevy with the modulator of Yao in order to properly control the polarization of the light propagating in the fiber (Yao, col.1 lines 6-8) and inherently alter the Q of the cavity due to induced polarization based reflection losses allowing for the storage and release of energy in the gain medium.

While not relied upon in this rejection, Imai et al. ("A wavelength Tunable Q-Switching EDF Laser with Fiber Bragg Grating Mirrors", Jpn. J. Appl. Phys., Vol. 35 (1996), pgs. 1275-1277, note col.2-3 lines 30-3) further speaks of the inherent altering of the cavity Q upon addition of stress to the fiber.

With respect to claim 21, Shevy and Yao teach the laser outlined in the rejection to claim 20 and further teach the reflectors and gain medium to be formed in a fiber chain (Shevy, fig.1 #100, [0030] lines 24-30), and said modulator to apply stress to the fiber chain to alter its birefringence and change the polarization of the light (Yao, col.2 lines 55-56).

With respect to claim 22, see rejection described above in regards to claim 3.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shevy in view of Yao, and further in view of DiGiovanni et al. (US 5237576).

With respect to claim 8, Shevy and Yao teach the laser outlined in the rejection to claim 1 including the laser pulse to be single frequency (Shevy, [0040] lines 1-7) but do not teach the length of the resonator to be less than 5 cm. DiGiovanni teaches a pumped fiber laser including gratings with a resonator length of 5 cm or less (col.2 lines 50-51). It would have been obvious to one of ordinary skill at the time of the invention to combine the laser of Shevy and Yao with the short resonator length of DiGiovanni to enhance mode stability and reduce susceptibility to temperature fluctuations and mechanical perturbations (DiGiovanni, col.2 lines 27-34).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

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PRIMARY EXAMINER